

while the females in this respect agree more closely with one another. On the strength of this consideration I am inclined to presume that all the larger examples of the bones of *Pezophaps* or *Didus solitarius* are those of adult males; while all the smaller ones, among which there is not the same remarkable difference of size, are those of females.

I have further to remark that, during the late visit of Professor Steenstrup to this country, I had the opportunity of showing the present collection of bones to that eminent naturalist; and that he corroborated an opinion I had already formed, namely, that these specimens bear undoubted traces of the birds to which they belonged having been eaten by men or predatory animals. Professor Steenstrup has enjoyed such extraordinary opportunities of examining the remains found in the kitchen-middens of his own country, that his judgment on this point is hardly to be questioned. I much wish I was not compelled to come to this conclusion; for, if it be so, the experience of the Danish archæontologists shows that the chances of obtaining, I will not say a complete skeleton, but such a series as would contain a perfect specimen of every bone in the skeleton, are very much diminished, since some bones there are which, I believe, are never found under these circumstances. I confidently look forward, however, to receiving before very long a still larger collection of Didine bones from the Mascarene Islands, and in that expectation I forbear to enter into any detailed description of the examples now exhibited; for I hope that with increased material in my hands there may be submitted to the Society a paper upon them suitable for publication in our 'Transactions.'

16. REMARKS UPON THE AFFINITIES OF THE PRONGBUCK (*ANTILOCAPRA AMERICANA*). BY A. D. BARTLETT, SUPERINTENDENT OF THE SOCIETY'S GARDENS.

Notwithstanding that this remarkable animal has been the subject of considerable notice, I believe few naturalists have felt perfectly satisfied with its supposed affinities; none, however, appear to have hesitated to place it among the hollow-horned Ruminants. Once there, its most interesting structure and economy were altogether overlooked and unsuspected. No writer that I can find, has ever stated that this animal carries deciduous horns. This character has always been considered to belong exclusively to the Cervine group of Ruminants; and however much the Pronghorn differed from the Antelopes, still it has been retained among them upon this supposed distinctive character. I will now endeavour to prove that this animal's affinities are closer to the genus *Cervus*, to which I think it more nearly allied, than to the Antelopes. Although it does possess to a great extent the characteristics of the hollow-horned Ruminants, still I think I shall be able to show that the horns of the Prongbuck are a modification of the horns of *Cervus*, with a strong resemblance to and intermediate character approaching the hollow-horned Ruminants'. In support of this statement, I adduce the fact that the Prongbuck

sheds its horns; and the evidence I am now able to produce and lay before you is positive and unmistakeable, although this has been denied repeatedly by many authorities. I call your attention to the following words of Messrs. Audubon and Bachman in their second volume of the 'Quadrupeds of North America,' p. 198.

"It was supposed by the hunters at Fort Union that the Pronghorned Antelope dropped its horns; but as no person had ever shot or killed one without these ornamental and useful appendages, we managed to prove the contrary to the men at the Fort by knocking off the bony part of the horn and showing the hard spongy membrane beneath, well attached to the skull, and perfectly immoveable."

Another well-known and eminent writer and naturalist, the late Sir John Richardson, in his 'Fauna Boreali-Americana,' says of the Prongbuck, at page 268.

"The females are stated by some American writers to have horns like the males, although smaller; but in one gravid and therefore at least nearly full-grown individual which I have examined, there was merely a short obtuse process of the frontal bone, scarcely to be felt through the fur and not covered with horn."

This was probably the first horn, which is doubtless covered with hair in its early stage of growth.

But in his recently-published work upon the Mammals of North America, contained in the Pacific-Railways Reports, Prof. Baird says (p. 667):—

"The female sometimes has no horns externally; frequently, however, there is a short horny tubercle of a few lines, occasionally two inches long; it does not show any curve, however, although usually warty at the base. When horns appear wanting in the female, they may sometimes be found concealed among the hair of the head."

Many who are now present will remember that in the month of January last a living male Prongbuck was purchased by this Society, and placed in the Gardens. The animal, at that time, was thin, and in poor condition, probably owing to the voyage it had so recently made from North America. Its horns were about three inches long, and exhibited no signs of the prong. This, however, could be felt among the hair at the base of the then growing horn. The animal made but little progress or improvement in condition till about the month of April. At this time it much improved, and the horns showed signs of rapid growth, apparently becoming complete with the prongs at midsummer. This condition continued until about the middle of October, at which time the horns appeared to have again commenced growing: not only were they increased in length, but they spread wider apart at the points.

On the morning of November 7th, the keeper, somewhat alarmed, called my attention to the fact that one of the horns of the Prongbuck had fallen off (fig. 1, p. 720). I hurried to the spot immediately, fearing that some accident had happened, and reached the paddock in time to see the second horn fall to the ground. My astonishment was much increased at observing that two fine new horns were already in the place of those just dropped, that these

Fig. 1.



Horn, as shed.

new horns were soft and covered with long, straight, smooth, and nearly white hairs, and that the bony core (that I had expected to see) was thickly covered with soft new horny matter. These new horns appeared larger than the hollow portion of the horns just cast

Fig. 2.



Horn, just before it was shed, showing the new horn beneath.

—an appearance due to the fact of their having pushed off the shed horns by their growth. The long hair at the base of the horns (see fig. 2) had concealed the separation that was taking place.

I will again quote Messrs. Audubon and Bachman. In their volume previously referred to they remark (p. 204) :—

“As to the shedding of the horns of this species, I never was able to ascertain it; but a fine buck we killed late in November had a soft space between the head and the horn, over the bone, that looked as if it had grown that length in one season.”

As a proof that the shedding of these horns was not the result of any disease or accident, I may remark that whenever the hollow horn of any Ruminant is broken or torn from its bony support, a copious discharge of blood immediately follows; and the horn so removed is never replaced by any subsequent growth. This remark applies equally to any injury done to the outer or velvety covering during the progress of growth of the solid horns of the genus *Cervus*: innumerable instances can be found; I will mention the following, which may be deemed sufficient to illustrate the truth of this statement.

A young male Nylghau (*Portax picta*) accidentally struck off the horny covering when these parts had become nearly full-grown, leaving the bony cores bare and bleeding; the bleeding continued a short time, and the bony stumps when dry became nearly black; the animal continued in good health, and bred with the females, and lived several years without the slightest sign of horny covering making its appearance.

I will not trouble you with further remarks upon this point, feeling it unnecessary, but proceed to direct your attention to the various forms and the differences in size to be found among the horns of the Prongbuck. I have selected a few illustrations from Prof. Baird's Report before alluded to, and these have been drawn and enlarged to life-size by my friend Mr. Jennens from a plate in that report. My friend, Mr. Moore, the Curator of the Derby Museum of Liverpool, has also kindly sent for my use the fine head and original horns that have been described by Dr. Gray, and figured in this Society's 'Proceedings' under the name *Antilocapra anteflexa*: to these I shall again allude.

Now this variation in form is more in accordance with my notions of *Cervus* than of the Antelope-type, in which no great diversity of form is found in the same species, while in the Deer-tribe the most remarkable variation is to be found in almost every species.

The Cervine characters consist, however, not only in a mere resemblance on account of diversity of form in the horns, but in the fact of their being deciduous, together with the hairy covering. But, in speaking of the affinities of this animal, I am struck by the peculiar resemblance it has to the Giraffe, not only in the structure of its horns, but in its legs and feet, the total absence of false hoofs, glands, &c. Nor can I avoid noticing the resemblance it bears to some of the Wild Sheep both in colour and general appearance, and in the thickness and structure of its coat. Here, again, its likeness to the Deer-tribe is most strongly marked—the white patch on the rump*, the brittle hair, the fine legs, the elastic gait, the full, dark eye, and

* A gland of considerable size exists in the back of this animal, immediately over the white patch.

the almost erect horns. But here, again, the Chamois is seen ; in fact it does appear to me that we have in this animal the elements of all the group—forcing one to call to mind the extinct monster *Sivattherium*, whose wonderful remains indicate to us a beast with four horns of great size, and, from their form, probably partaking of the characters of several different existing forms ; and the remarkable difference in form of the pair of horns in the fore part of the skull as contrasted with those behind, affords the ground for much speculation upon this subject.

But to return to the animal under consideration. May it not be one of the remnants of an extinct race, whose diversity of characters point out to us by a very easy method how one form may slowly glide to the right or to the left as it were, and by little alteration become a *Stag*, an *Antelope*, or a *Sheep* ?

The consideration of the peculiar structure and remarkable variation in the size and form of the horns of the Prongbuck has led me to believe that this animal may approach more nearly to the genus *Cervus* than to any other ; and this idea prompts me to suggest that the hairy covering in which the newly-formed bony core is enveloped during the growth of the Stag's horns is the homologue of, and should be regarded as representing, the horny part which is more strongly developed on the bony cores of the hollow-horned Ruminants—or, in other words, that the so-called solid-horned Ruminants (*Cervus*) shed their horny, hairy, dried, vascular covering at the completion of the growth of the bony core.

This explanation of the process of the development of all horns appears to me more probable and natural, inasmuch as the covering of the deciduous horns is always, or nearly always, hairy, while these hairs have their terminal roots upon the inner surface, and this character is carried out in a most remarkable manner in the horns of the Prongbuck.

The hairs connected with this structure are not only very numerous, but pass completely through the horny structure, extending from the base of the horn upwards above the prong. In proof of this, I was myself astonished when taking a cast of the internal part of the hollow horn ; the cast, upon being withdrawn, presented the appearance of the specimen now before you.

It is probable there may be objections offered to this theory of the growth of the so-called solid horns, seeing that, in the early condition of the budding forth of the new horn, the parts are largely supplied with numerous blood-vessels, and from their power to deposit rapidly the bony matter, the increase of which carries out at a marvellously rapid rate this vascular and cuticular or tegumentary covering. By the rapid growth of bone, the outer covering becomes thin, and the circulation is cut off at the base by the increase and development of the bur. As its functions cease it soon becomes withered, and is shed, leaving the branching bony structure to fall off after the rutting-season.

If this be the correct explanation of the growth of some of the structures now under consideration, I think a considerable difference

will be found in the growth and formation of the horns of the Prongbuck; it will be seen that the bony core is much smaller, when compared with the cavity or hollow space in the horny casing, than in any other hollow-horned Ruminant that I am acquainted with. This fact, I think, will show that the space admits of the growth and formation of the new horn, the bone being thickly covered with vascular integument; and the hairs appear to grow upon the surface of this, beneath the old horn; the extreme point appears first to put on the horny matter (see fig. 4, p. 724); this increase of growth, acting like a wedge, forces the old horns upwards and outwards until they fall off.

An examination of the cast horn from the living specimen at the Gardens, shows clearly the structure and the singular manner in which the hairs pass through the horny substance; that they do so is clearly to be seen by the casts now on the table. Being a little puzzled, on looking into the cavity of the cast horns, at the small size of the hollow, I determined to take a cast of the interior; for this purpose I melted some gutta-percha and filled up the hollow space, and as soon as it had become hard, I withdrew the specimen before you, covered, as you see, with the hairs in the same manner as the new horns on the head of the living animal: the roots of these hairs having become fixed in the gutta-percha, were drawn through the minute openings in the horn. This can be done easily upon any of the specimens of the shed horns of this animal.

Fig. 3.



With reference to the frequency of the shedding of the horns of this animal, I can only offer a surmise. Judging from the rapidity of the growth of the young horn, I reasonably conclude that it occurs annually. In support of this, it may be remembered that our animal's horns in January last were barely 3 inches in length, while by June of the same year they were fully formed, and measured 8 inches; they were cast the first week in November—that is, on the 7th; the new horns on that day (see fig. 3) were about 4 inches long; they are now, this day, 6 inches long, having grown 2 inches in twenty-one days (see fig. 4).

Besides this, we have the testimony of Messrs. Audubon and Bachman, as previously quoted, that in the month of November they found in the buck killed by them the soft space between the horn

Fig. 4.



and the skull, which they supposed to be due to that year's growth. A still further proof bearing upon this conclusion will be equally well seen in the fine specimen now before the meeting, kindly lent by my friend, Mr. Moore, from the Derby Museum at Liverpool; this example is evidently from a larger and older animal, as is shown by the superior size of its horns. The core upon which the freshly-developed horn rests has been removed from the hollow horny cavity; and it will be seen that it has already attained a length of $6\frac{1}{2}$ inches, in this respect being larger than that of the Society's animal when first shed.

One remarkable feature yet unnoticed is the absence in the new horns of the curved or hooked point. This part of the subject necessarily requires further observations during its growth; but I have already noticed that the extreme horny point is moveable at the apex of the bony core. This suggests to my mind the possibility of the point assuming a contrary direction during its growth, probably by an accident; and this would well account for the remarkable disposition of the specimen now before you from the Liverpool Museum, described and figured in the Society's 'Proceedings' for 1855 (p. 10), by Dr. Gray, under the name of *Antilocapra anteflexa*. I am therefore inclined to believe that this individual does not represent a different species, but a deformity of growth.

Having, I hope, at least, proved beyond all doubt the deciduous nature of the horns of the Prongbuck, and alluded to what I consider its affinities, and these considerations being founded principally upon the character of the horns, I am obliged to admit the great difficulty I see in the classification or arrangement of the Ruminantia upon this character only, seeing that in both Deer (*Cervus*) and Antelopes the females, in some instances, carry horns, and in the smaller members of the family the males as well as females are without these appendages. Nevertheless I believe there is no other

character of equal importance, and that by an increased knowledge of these structures a nearer approach to the perfect arrangement of this important group will be made.

In concluding, I think I have shown—

- 1st. That the Prongbuck is not a true Bovine animal.
- 2ndly. That this animal sheds its horns.
- 3rdly. That the structure of these organs appears to be imperfectly understood.

DESCRIPTION OF THE FIGURES.

Fig. 1. Perfect horn when shed, November 7th.

2. Old horn in process of being thrown off, showing the separation between the old and the new horn.
3. New horn, as it appeared when the old horn had been shed.
4. New horn after twenty-one days' growth.

17. SHORT ACCOUNT OF PART OF A SKELETON OF A FINNER WHALE, SENT BY MR. SWINHOE FROM THE COAST OF FORMOSA. BY DR. J. E. GRAY, F.R.S., F.L.S., V.P.Z.S., ETC.

Mr. Swinhoe has sent to the British Museum part of the head, three cervical vertebræ, the first and seven other dorsal vertebræ, and eight ribs of a large Finner Whale which was thrown ashore on the coast of Formosa. The bones are nearly of the size of similar bones of the European Finner (*Physalus antiquorum*), which often reaches to the length of 60 or 70 feet, and they most probably belong to an animal nearly of that size.

The second and third cervical vertebræ are united, as in the small Finner (*Balænoptera rostrata*) of Europe, while in all the larger Finners which are as yet known these two bones are always free.

This union of the second and third cervical vertebræ is one of the characters by which the genus *Balænoptera* is separated from the genus *Physalus*. The front part of the neural canal has the sub-circular form of that of the genus *Balænoptera*, and not the oblong, transverse form of the neural canal in *Physalus*. I am therefore inclined to refer these bones to the genus *Balænoptera* until we know more of the skeleton and external form of the animal.

I am, however, inclined to believe that when the animal and its skeleton are better known it will be found to have some particular characters, as the forms of the bodies of the vertebræ and the lateral processes show some alliance to the genus *Physalus*. It is to be regretted that the number of the vertebræ, the form of the lumbar vertebræ, and the form of the first ribs were not observed; and they are all required to determine with certainty to what genus it must hereafter be referred. It may for the present be designated

BALÆNOPTERA SWINHOII.

The second and third cervical vertebræ are united by the anchy-